OCHEM I

SUBSTITUTIONS&ELIMINATIONS

	SN1	E1
Kinetics	Rate = k[R-LG]^1 First order, Two steps	Rate = k[R-LG]^1 First order, Two steps
Solvent	Polar protic Ex. Water, acetic acid (CH_3COOH), ethanol (EtOH), Methanol (MeOH, CH_3OH)	Polar protic Ex. Water, acetic acid (CH_3COOH), ethanol (EtOH), Methanol (MeOH, CH_3OH)
Leaving Group	Weakest Base Ex. I^- > Br^- > Cl^-	Weakest Base Ex. I^- > Br^- > Cl^-
Substrate	Tertiary >> Secondary <u>No</u> Primary Goes through carbocation intermediate -> subject to carbocation rearrangements	Tertiary >> Secondary <u>No</u> Primary Goes through carbocation intermediate -> subject to carbocation rearrangements
Mechanism		
Nucleophile	Weak/Uncharged Ex. H_2O, H_2SO_4, EtOH	Weak/Uncharged Ex. H_2O, H_2SO_4, EtOH
Product	50:50 racemic mixture	Zaitsev alkene (double bond) formed
Graph		
Extra Notes	If "warm" conditions <u>both</u> SN1 and E1 will be the product	Heat favors elimination

OCHEM I
SUBSTITUTIONS&ELIMINATIONS

	SN2	E2
Kinetics	Rate = $k[R\text{-}LG]^1[Nu]^1$ Second order overall, One step	Rate = $k[R\text{-}LG]^1[Nu]^1$ Second order overall, One step
Solvent	Polar aprotic Ex. DMF, DMSO, THF, Acetone, HMPA	Polar protic or Polar aprotic (Typically polar protic)
Leaving Group	Weakest Base Ex. $I^- > Br^- > Cl^-$	Strongest base with a pKa higher than 11
Substrate	Primary >> Secondary <u>No </u>Tertiary	Tertiary >> Secondary > Primary
Mechanism		
Nucleophile	Strong and Charged Ex. NaCN, KOH Note: Na and K are spectator ions, a placeholder for charge, making CN⁻, which is strong and charged	Strong and Charged base
Product	<u>Inversion</u> of Stereochemistry	Zaitsev or Hoffman alkene (double bond) formed
Graph		
Extra Notes	Nucleophile is attacking sigma star	Big bulky base will make the less substituted product (Hoffman)
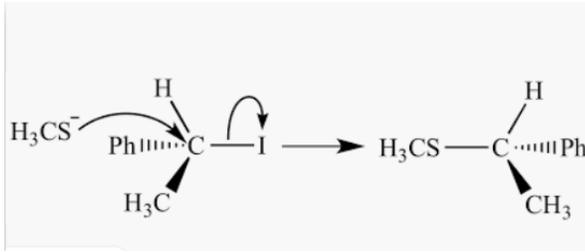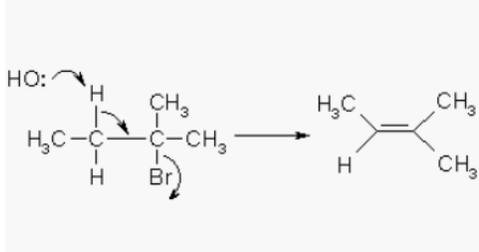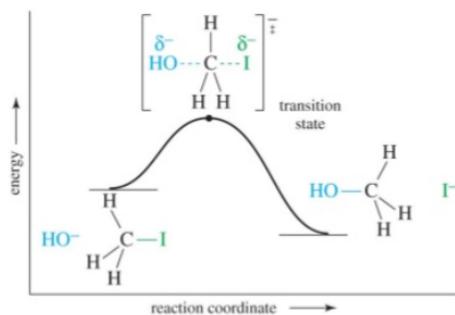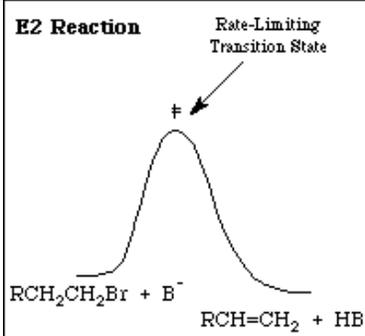
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